Innovative Traffic Data Collection: An Analysis of Potential Uses in Florida

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Outline of Presentation

- Background of Traffic Data Collection
- Technologies Reviewed
- Recommendations
- Transponder Data Field Test

Background

- Traditional data collection
  - “Point sensing” – samples all vehicles at a certain location
  - Parameters:
    - Volume, occupancy, vehicle classification
    - Often vehicle speed
- Probe data collection
  - “Link or Section Sensing” - samples some vehicles, not all
  - Parameter:
    - Travel Time
- Our institutions are not used to travel-time based data

Technologies Reviewed

This analysis focuses on the following innovative data collection technologies:

- In-Vehicle Transponders
- License Plate Readers
- Cellular Probes
- Transit Automatic Vehicle Location
- Private Fleet-based Automatic Vehicle Location (AVL)
- In-Vehicle Probes - Telematics

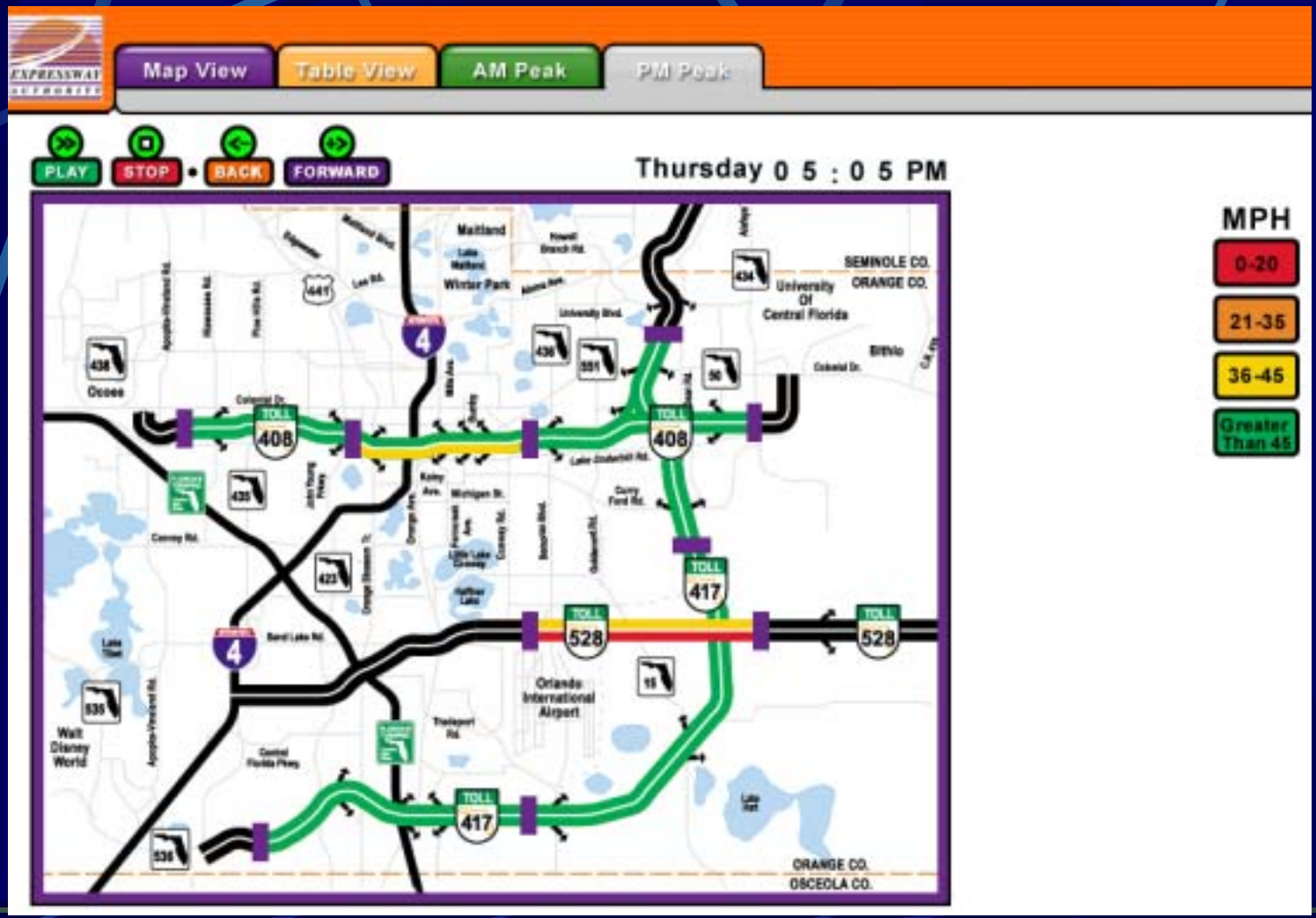
In-Vehicle Transponders

- Largest type of probe system in use in the U.S. today
- Mature area-wide systems in Houston and San Antonio
- Single facility system in Atlanta
- Evolving to area-wide in New York City
- Under development in Chicago, Massachusetts and Orlando
- Requires roadside devices to cover links
- Potential Privacy Issue

In-Vehicle Transponders (2) Status in Florida

- Approximately 700,000 SunPass and E-PASS transponders operating statewide
- Orlando-Orange County Expressway Authority (OOCEA) currently pilot testing a travel time data collection system
- Additional research to be carried out concerning the penetration of commercial vehicle electronic screening (Pre-Pass) transponders

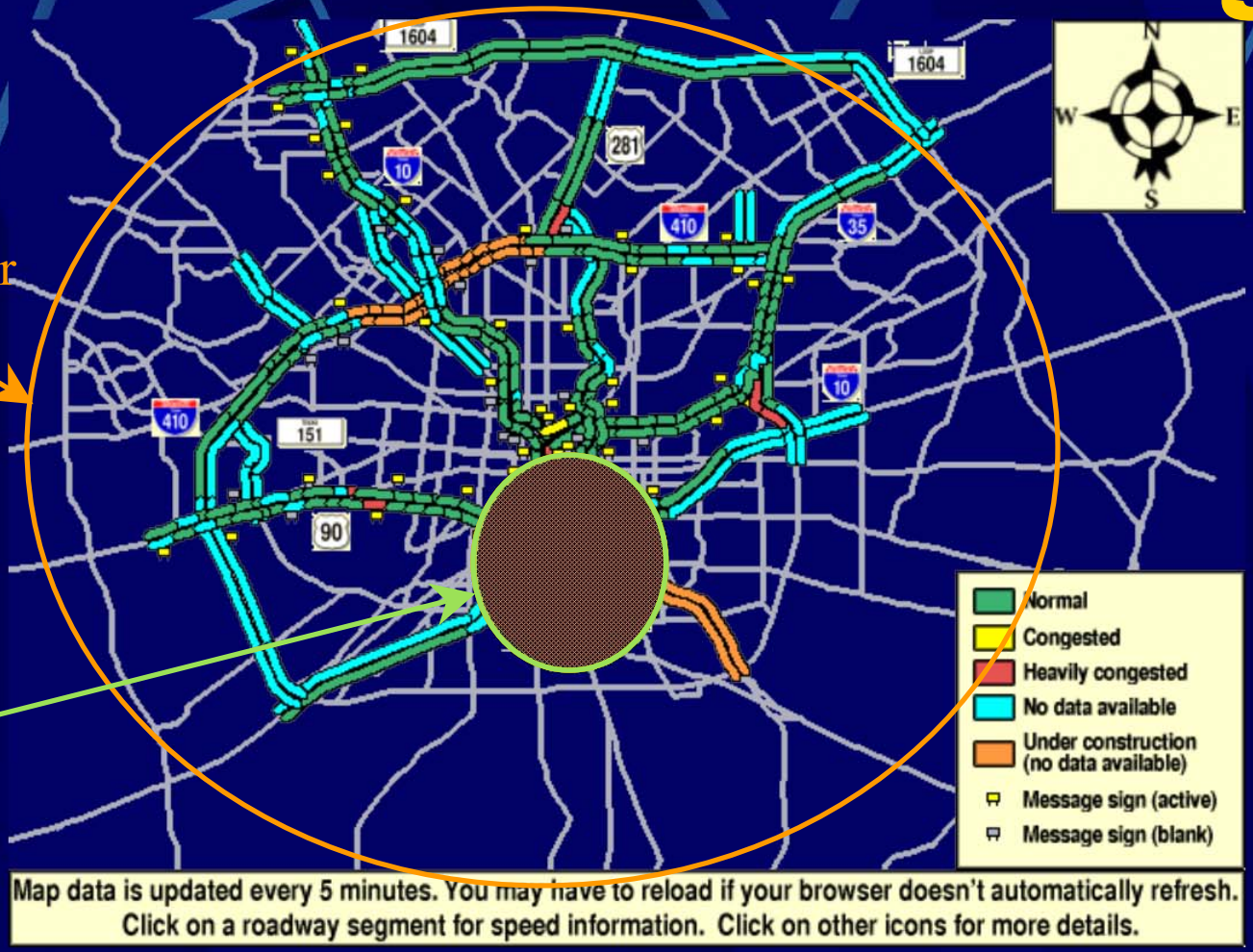
In-Vehicle Transponders (3)



In-Vehicle Transponders (4)
San Antonio -- Coverage

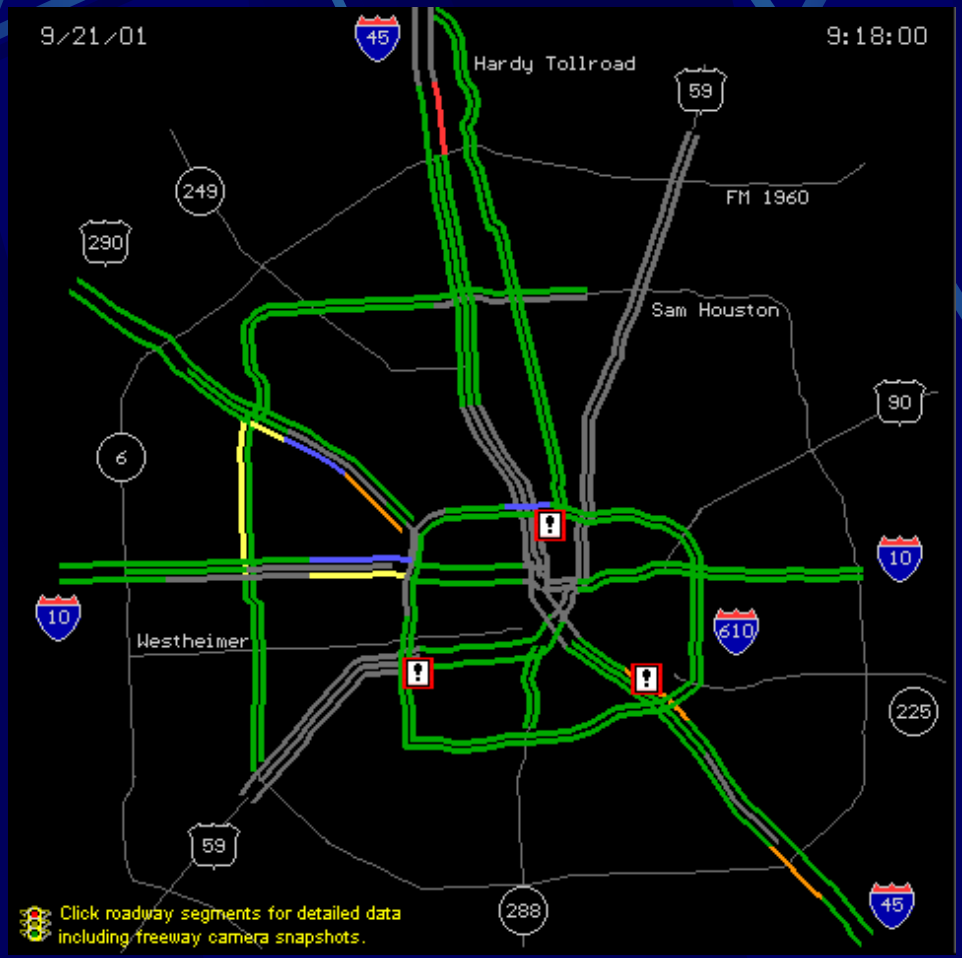
Transponder Data

Loop Detector Data



http://www.transguide.dot.state.tx.us/map/

In-Vehicle Transponders (5) Houston Coverage



HOUSTON TRANSTAR

Speed Ranges (MPH)

- 0-19
- 20-29
- 30-39
- 40-49
- 50+
- N/A

Freeway Incidents

- Active Incident
- Cleared Incident

http://traffic.tamu.edu/

In-Vehicle Transponders (6) Lessons Learned

- Accuracy
  - 2-10% vehicle penetration required
- Cost-effectiveness
  - If electronic toll collection system in region
- Challenging for regions without toll facilities
  - Could be overcome if transponders were part of the original equipment placed on vehicles

License Plate Readers

- Proven in the UK by Trafficmaster
- Currently being tested in Oregon
- Offer great promise, especially in areas with low transponder penetration

Cellular Probes

- Background
  - Wireless “enhanced” 911 is driver
  - Wireless carriers must deploy systems to locate emergency callers
  - Carriers choosing network-based or handset-based technologies
  - Some technologies could also support traffic monitoring
- Status
  - Not yet in operational use
  - Technical, privacy and driver distraction of cell phone use are possible issues being addressed

Transit Automatic Vehicle Location (AVL)

- Fleets of transit vehicles as probes for assessing travel times
- Test of AVL equipped buses in Orange County, California
  - Little correlation between real traffic speeds and estimates based on transit probe data
- No full deployments of such systems currently exist anywhere in the US

Private Fleet Automatic Vehicle Location

- Fleet management systems to approximate real-time inter-city traffic conditions
  - e.g. Qualcomm's OmniTRACS – over 300,000 vehicles nationwide
- Barriers
  - Fleets own data – not location provider (Qualcomm)
  - Will fleets cooperate?

In-Vehicle Probes - Telematics

- Location sensing and wireless technologies built into vehicles facilitate the collection of “probe data”
- Growing number of telematics enabled vehicles, but critical mass is likely some time off
  - OnStar ~ 2 million vehicles
- Multiple proprietary efforts may dilute vehicle penetration
  - OnStar, InfoMove, WingCast, etc.
- No substantial public sector involvement as of yet

Recommendations

- In-Vehicle Transponders
  - Deploy transponder-based system along the FIHS where sufficient penetration exists
- License Plate Readers
  - Candidate for use where transponder penetration insufficient
  - Conduct proof of concept test
- Cellular Probes
  - Driven by wireless carriers, not transportation
  - Monitor progress, but do not put on critical path

Recommendations (2)

- Transit AVL
  - Monitor progress of other transit agencies
- Private Fleet AVL
  - Share findings with ITS America, JPO, and/or ATA
  - Contact Florida Trucking Association to assess interest
- In-Vehicle Probes – Telematics
  - Continue to monitor market penetration and progress

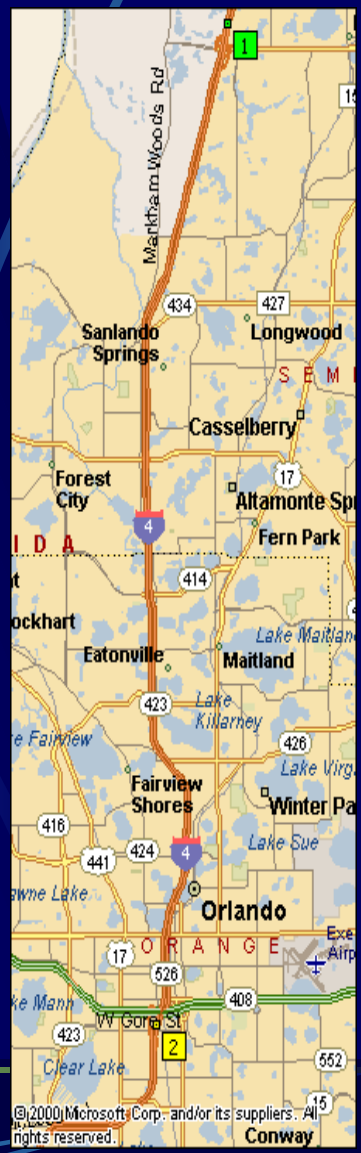
Transponder Data Field Test

- Determine:
  - Current transponder penetrations throughout Florida
  - Where transponder penetrations sufficient for travel time data collection
  - Rules of thumb for reader spacing

Transponder Data Field Test (2)

Transponder Data Field Test (3)

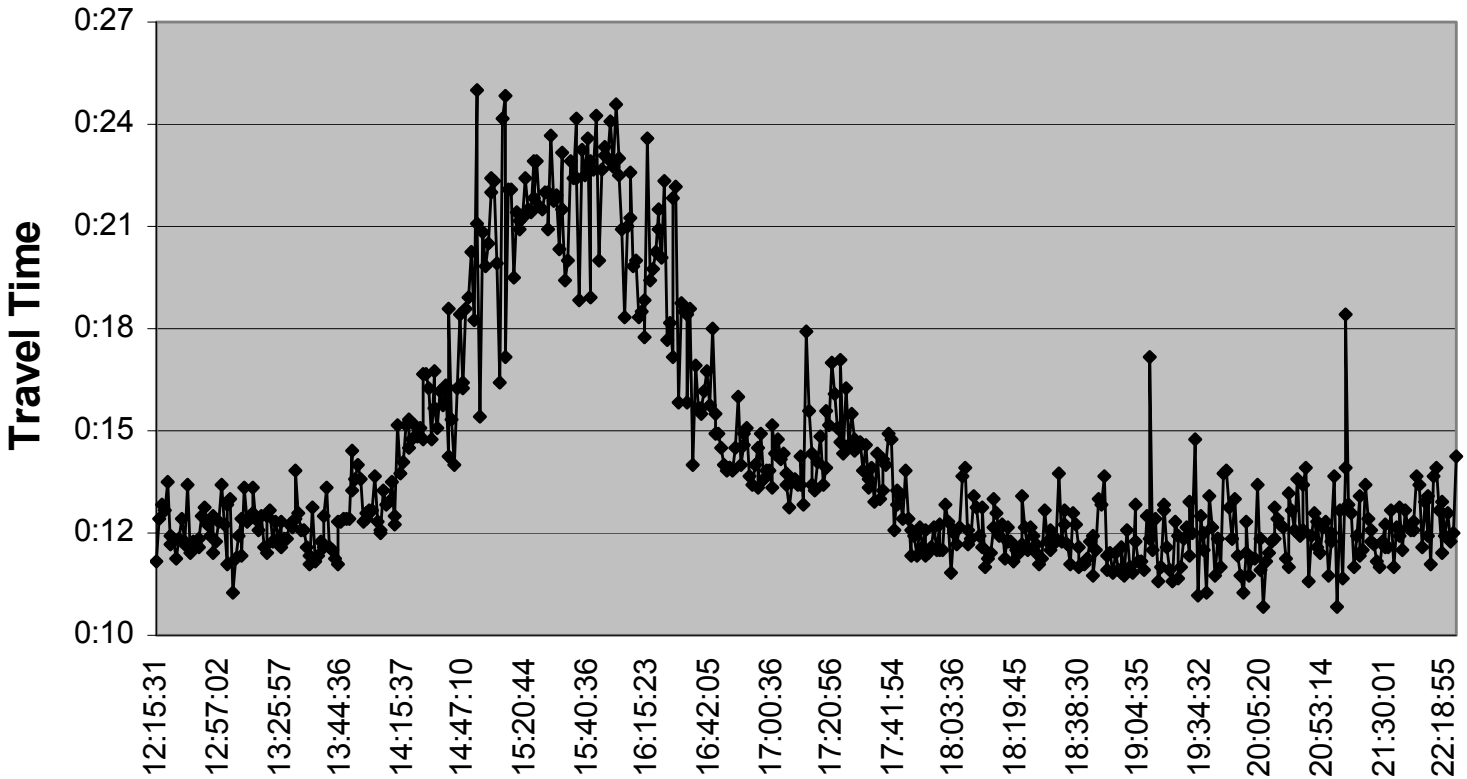
- Preliminary Results – I-4 WB (Orlando)
  - Transponders in Traffic Stream (Exit 50)
    - Average Hourly Transponder Reads – 280
    - Average Hourly Traffic Volume – 1706
    - Average Penetration of Transponders – 16.4%
  - Transponders in Traffic Stream (Exit 37)
    - Average Hourly Transponder Reads – 472
    - Average Hourly Traffic Volume – 2342
    - Average Penetration of Transponders – 20.1%
  - Average Number of Matched Links/Minute ~ 1



Transponder Data Field Test (4)

- Preliminary Results – I-95 SB (Ft. Lauderdale)
  - Transponders in Traffic Stream (Exit 36C)
    - Average Hourly Transponder Reads – 135
    - Average Hourly Traffic Volume – 1444
    - Average Penetration of Transponders – 9.5%
  - Transponders in Traffic Stream (Exit 21)
    - Average Hourly Transponder Reads – 83
    - Average Hourly Traffic Volume – 841
    - Average Penetration of Transponders – 9.9%
  - Average Number of Matched Links/Minute ~ .23

Transponder Data Field Test (5)



Additional Information

- The research paper on which this presentation is based can be downloaded from: http://www.floridaits.com/PDFs/TM1_Innovative_Data_Collection_Analysis_V1.pdf

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